CHAPTER 2

THE NEED FOR COMMISSIONING

2-1. General background

Due to competitive pressures, owners look for low cost and abbreviated schedules to bring a facility from concept to operation. These competitive driving forces are reflected in the facility designers' and contractors' price. To be price competitive, commissioning is often given cursory attention or overlooked all together. The design and construction of the facility and its equipment are a given. They are visible, tangible, and difficult to argue. The effort of assuring systems operate as intended and that operating and maintenance (O & M) staff are trained is easier to argue and therefore an easy target for cost reduction.

a. Complex building systems. Building systems continue to change and have become more complex. The result is an increase in the likelihood of more errors in design and installation and an increase in improper system operation. When systems do not operate correctly, their cost of operation and maintenance increases. The savings which were supposed to be achieved because of the high tech nature of the new equipment and building system components is never realized. The need for commissioning becomes apparent after the owner takes possession of the facility. Tenant complaints, contractor call-backs, and, in extreme cases, litigation results in additional costs to resolve inadequate operation of non-commissioned systems.

b. Commissioning today. Commissioning today is continually evolving. Depending on the size of the facilities, the sophistication of their systems, their location, the needs of their tenants, and the design intent of the owner, commissioning can be applied in varying degrees to minimize problems and costs for all parties by providing a means to methodically achieve proper system operation.

2-2. The importance of commissioning

The evolution of facility construction and the current impetus on reduced cost/schedule has lead to the modern day system of design-bid-construct. The owner-engineer-contractor relationship has become confrontational and blame oriented and thrives on cutting costs and achieving schedule as the goal. The commissioning process, when applied through the life of a facility project, redirects the project's goal to the end user.

a. Commissioning, owner needs. The owner, tenant, or entity which will be using the facility has needs. The purpose of the facility is to fulfill these needs. Therefore from preparation of the design basis document through final acceptance, the emphasis of the project should remain on meeting these needs with reasonable cost and schedule as the goal of the project. When these needs are met, the problems, the costs, and the delays are minimized.

b. Commissioning, goal. The goal of commissioning as a fourth member in the life cycle of a facility is to produce a facility suited for the end user. By focusing on the end users' needs as the goal, the commissioning process provides the facility manager a well honed facility capable of meeting these needs. A smooth operating facility also means less maintenance and operating costs, less facility down time, and less facility related interruptions to the user.

2-3. The economics of commissioning

No direct method has been established to determine commissioning costs. Savings resulting from commissioning are difficult to quantify because each construction project is unique and depends on building size, location, complexity, sophistication of equipment/systems, and the number of systems involved.

a. Economic benefits. Unfortunately, qualitative benefits alone will not make a convincing case for commissioning. The lack of information about the exact costs and benefits of commissioning is a clear gap in the information available to encourage further investments in commissioning. Enough studies have been done, however, to produce estimates of the potential savings that can result from performing commissioning.

b. Commissioning cost. Determining commissioning cost varies but ranges from $0.01 per square feet per year to $2.50 per square feet per year. The approximate average appears to be about $0.30 per square feet per year, but this figure cannot be applied to any specific type of building. Other sources have calculated commissioning costs as 5 to 6 percent of mechanical construction cost, 2 to 3 percent of electrical construction cost, or 0.5 to 3 percent of entire building cost.

c. Commissioning savings. The commissioning process can provide savings resulting from the following.

(1) Improved understanding of the purpose of the facility and the reason for its existence to serve the end user.

(2) Improved facility and systems because all parties involved in the life cycle are focused on the end users' needs as the primary goal of the facility.

(3) Improved coordination between the owner, engineer, and contractor resulting in appropriate costs, schedule, system operation, and reduced change orders.

(4) Improved systems operation, reduced energy consumption, reduced call-backs, and reduced claims and litigation because thorough acceptance tests were conducted, all systems were brought up to operate per design, and performance was optimized.

(5) Reduced maintenance costs because of improved equipment life and reliability.

(6) Improved maintenance and reduced maintenance man-hours because of available documentation and training.

(7) Improved building environment resulting in improved worker productivity.

d. Reported commissioning cost savings. Cost savings resulting from commissioned versus non-commissioned facilities for energy savings are reported from 8 to 50 percent ($0.50 to $1.25 per square feet saved) with average savings of about $0.50 per square foot. Cost savings resulting from commissioned versus non-commissioned facilities for maintenance savings are reported from 15 to 35 percent ($0.50 to $1.25 per square feet saved). More information on the importance and economics of commissioning is found in the American Society of Heating, Refrigeration and Air-Conditioning

Engineers, Inc. (ASHRAE), Guideline 1-1996, The HVAC Commissioning Process, and Heating/Piping/Air-Conditioning Magazine (HPAC), April 1998.